

What is claimed is:

1. A system for cooling heat generating components, said system comprising:  
a variable speed blower;

5 a plenum having an inlet and a plurality of outlets, wherein said inlet of said plenum is in  
fluid communication with said blower;

a plurality of nozzles, each of said nozzles having a first end and a second end, said first  
ends of said nozzles being connected to said plurality of outlets of said plenum and said second  
ends of said nozzles terminating at a location substantially close to at least one heat generating  
10 component; and

a valve located along each of said nozzles to independently vary a flow of said fluid  
through each of said nozzles.

2. The system according to claim 1, further comprising:

15 a plurality of valve controllers, each of said valve controllers being connected to at least  
one of said valves, wherein said plurality of valve controllers are operable to independently  
control each of said valves to thereby control the flow of said fluid through each of said nozzles.

3. The system according to claim 2, further comprising:

20 a plurality of temperature sensors, each of said temperature sensors being configured to  
measure a temperature of each of said heat generating components, wherein said valve controllers  
are configured to independently control each of said valves in response to said measured  
temperatures of each of said heat generating components.

25 4. The system according to claim 2, wherein each of said valve controllers is  
operable to independently control each of said valves on the basis of an anticipated amount of  
heat predicted to be generated by each of said heat generating components.

5. The system according to claim 2, further comprising:

30 a blower controller operable to control the speed of said blower, wherein said blower  
controller is operable to vary an output of said fluid from said blower in response to signals  
received from said plurality of valve controllers to thereby vary the fluid supply in said plenum.

6. The system according to claim 1, further comprising:  
a blower controller operable to control the speed of said blower; and  
a pressure sensor situated within said plenum to measure a pressure of said fluid located  
within said plenum,

5 wherein said blower controller is operable to vary an output of said fluid from said blower  
on the basis of a measured pressure of said fluid in the plenum.

7. The system according to claim 1, wherein said plenum includes a divider, said  
divider operable to divide said plenum into a first chamber and a second chamber.

10 8. The system according to claim 7, wherein said first chamber is in fluid  
communication with said blower and said second chamber is in fluid communication with said  
nozzles, and wherein said divider operates to maintain a pressure of said fluid in said second  
chamber at a substantially uniform pressure.

15 9. The system according to claim 1, wherein said valves comprise pulsating valves.

10. A method of cooling a plurality of heat generating components of an electronic  
system having an enclosure and a plenum located within said enclosure, said method comprising:

20 activating at least one variable speed blower and a plurality of valves, each of said valves  
terminating substantially close to a respective heat generating component, to thereby supply  
cooling fluid to said heat generating components;

sensing the temperatures of each of said heat generating components;

25 determining whether said sensed temperatures are within a predetermined temperature  
range; and

varying said supply of said cooling fluid to said heat generating components in response  
to said sensed temperatures falling outside of said predetermined temperature range.

11. The method according to claim 10, further comprising:

30 determining whether the measured temperatures of said heat generating components are  
each below or equal to a predetermined minimum set point temperature;

decreasing the supply of said cooling fluid to said heat generating components for those heat generating components having measured temperatures that fall below or equal said predetermined minimum set point temperature; and

increasing the supply of said cooling fluid to said heat generating components for those heat generating components having measured temperatures that exceed said predetermined minimum set point temperature.

12. The method according to claim 11, further comprising:

decreasing the speed of said at least one blower in response to said decreasing cooling fluid supply to said heat generating components exceeding said increasing cooling fluid supply to said heat generating components.

13. The method according to claim 11, further comprising:

increasing the speed of said at least one blower in response to said decreasing cooling fluid supply to said heat generating components falling below said increasing cooling fluid supply to said heat generating components.

14. The method according to claim 10, further comprising:

sensing a pressure of a supply of said cooling fluid;  
determining whether said sensed pressure is within a predetermined pressure range; and  
varying said speed of said at least one blower in response to said sensed pressure falling outside of said predetermined pressure range.

15. The method according to claim 14, wherein said step of varying said blower speed comprises determining whether said measured pressure falls below or equals a predetermined minimum set point pressure range.

16. The method according to claim 15, further comprising:

increasing the speed of said at least one blower in response to said measured pressure falling below or equaling said predetermined minimum set point pressure.

17. The method according to claim 15, further comprising:  
decreasing the speed of said at least one blower in response to said measured pressure exceeding said predetermined minimum set point pressure.

5 18. A rack system for housing a plurality of heat generating components, said rack system comprising:

an enclosure having a plenum including a divider separating said plenum into a first chamber and a second chamber, said second chamber comprising a plurality of outlets for discharging a cooling fluid, said plenum extending generally along a side of said enclosure;

10 at least one variable speed blower configured to supply the cooling fluid into said plenum;  
a plurality of nozzles having a first end in fluid communication with each of said plurality of outlets and a second end positioned substantially close to a respective one of said heat generating components; and

15 a plurality of valves, each of said valves being operable to vary the flow of said cooling fluid through each of said nozzles.

19. The rack system according to claim 18, further comprising:  
a plurality of valve controllers, each of said valve controllers being connected to at least one of said valves, wherein said plurality of valve controllers are operable to independently  
20 control each of said valves to thereby control the flow of said fluid through each of said nozzles;  
and

a blower controller operable to control the speed of said blower, wherein said blower controller is operable to vary the output of said fluid from said blower in response to signals received from said plurality of valve controllers to thereby vary the fluid supply in said plenum.

25 20. The rack system according to claim 18, further comprising:  
a blower controller operable to control the speed of said blower; and  
a pressure sensor situated within said plenum to measure the pressure of said fluid located within said plenum,

30 wherein said blower controller is operable to vary the output of said fluid from said blower on the basis of the measured pressure of said fluid in the plenum.